Claims

1. A thermogravimetric analyzer comprising:

a flexural plate wave mass sensor comprising a sample-holding region;

a flexural plate wave reference sensor;

a heat spreader configured to conduct heat substantially evenly to the mass sensor and the reference sensor;

a heater in thermal communication with the heat spreader;

an analysis module, in electrical communication with the mass sensor and the reference sensor, for determining, based on outputs of the mass sensor and the reference sensor, a change in mass of a sample in the sample-holding region caused by action of the heater.

2. The thermogravimetric analyzer of claim 1 wherein the heater is a variable-output, controllable heater.

3. The thermogravimetric analyzer of claim 2 further comprising:

a control module in electrical communication with the heater for varying the heat output of the heater in accordance with an analytical protocol.

4. The thermogravimetric analyzer of claim 3 wherein the control module causes the heater to heat the sample in accordance with a pre-determined time-temperature pattern.

5. The thermogravimetric analyzer of claim 1 further comprising:

a temperature sensor in thermal communication with the mass sensor; and

a temperature sensor in thermal communication with the reference sensor, the analysis module analyzing the determined change in mass in relation to the outputs of the temperature sensors.

6. The thermogravimetric analyzer of claim 1 further comprising a plurality of flexural plate wave mass sensors arranged in an array.

7. The thermogravimetric analyzer of claim 6 further comprising a plurality of flexural plate wave reference sensors, each flexural plate wave sensor corresponding to and outputting a reference signal for one of the arrayed plurality flexural plate wave mass sensors.

8. A method of conducting thermogravimetric analysis comprising:

providing a flexural plate wave mass sensor configured to output a mass signal;

depositing a sample in the mass sensor;

providing a flexural plate wave reference sensor configured to output a reference signal;

evenly heating the mass sensor and the reference sensor; and

determining a change in mass of the sample in response to the heating based on the mass signal and the reference signal.

9. The method of claim 8 further comprising:

measuring a mass output from the mass sensor;

measuring a reference output from the reference sensor; and

subtracting the reference output from the mass output.

10. The method of claim 8 further comprising monitoring the temperatures of the mass sensor and the reference sensor as the sample is heated.

11. The method of claim 10 further comprising determining a heat-mass response characterization of a sample based on the determined mass changes in relation to the monitored temperatures.

12. The method of claim 10 further comprising determining a heat-mass-time response characterization of a sample based on the determined mass changes, the monitored temperatures, and the time at which the sample was maintained at the monitored temperatures.

13. The method of claim 8 wherein the heating is controlled in accordance with an analysis protocol.

14. The method of claim 8 wherein the heating is controlled in accordance with a pre-determined time-temperature pattern.